

II. *Astronomical Observations by the Missionaries at Pekin. Transmitted to the Supra-cargoes at Canton, by the Rev. Father Louis Cipolla, of the Tribunal of Mathematics, and communicated to the Royal Society by the Court of Directors of the East-India Company\*.*

PREFACE, BY THE ASTRONOMER ROYAL.

Redde, Nov. 4, 1773. **M**OST of the following Observations appear to have been made with a telescope of eight feet, to which a micrometer, for measuring differences of right ascension and declination was occasionally adapted. There was besides another telescope of eight feet, consisting of two object-glasses, in the manner of RÖEMER, which might be brought nearer together or separated, in order that the moon's diameter might completely fill a fine reticule, in the focus, divided into twelve equal parts, for measuring the digits eclipsed in lunar eclipses. It is mentioned in the account of the lunar eclipse of Nov. 12, 1761, that

\* The Society was favoured with another copy of these Observations by John Blake, Esq. of Parliament-street, to whom they were transmitted by his son John Bradby Blake, Esq. Supra-cargo at Canton.

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the

the clock was regulated by a transit instrument. It is therefore probable, it was regulated in the same manner in all the succeeding observations, which consist of the following particulars.

1. Observations of the last transit of Venus over the Sun, viz. of differences of right ascension and declination between Venus and the Sun, and the internal and external contact of the limbs at the egress. It is however remarked, that the clock was counted by a person, who was sometimes found to make mistakes.

2. The eclipse of the Sun, May 25, 1770. The beginning and end were observed, and the lucid parts measured, during the eclipse, with the micrometer.

3. The beginning and end of the eclipse of the Moon, Oct. 23, 1771.

4. Emerfion of Jupiter from occultation by the Moon, July 5, 1770.

5. An Occultation of Spica Virginis by the Moon; the immersion and emerfion both observed, Jan. 25, 1772.

6. The occultation of a star in Scorpio by the Moon; the immersion and emerfion both observed.

7. The observation of Venus in the Sun's parallel, Jan. 5, 1772, by taking the difference of right ascension and declination of Venus and the Sun.

8. The total eclipse of the Moon, Nov. 12, 1761. The beginning, total immersion, emerfion, and end, were observed by three different observers, with telescopes of 5, 7, and 8 feet, in the domestic obser-

vatory of the College of the Jesuits; where also all the former observations were made. The same eclipse was also observed at the Royal Observatory at Pekin, 14'' west of the Jesuit's College, with a telescope of 8 feet, composed of two object-glasses, with a reticule at the focus, divided into 12 equal intervals for measuring the digits eclipses, in the manner of RÖEMER. It is remarked, that the leaf, in which this observation was recorded, had been lost, and was found again, Oct. 12, 1772: on which account this observation was never transmitted to Europe before.

NEVIL MASKELYNE.

Transitus & infra discum ☉, die 4 Junii, anni  
1769. Pekini, in residentiâ S. Josephi, tubo.  
8 pedum, observatus.

Temp. ver. mat.

h ' "			' "		
4	42	5	limbus occ. ☉ ad horarium		
4	44	21	limb. ort. ☉ ad hor.		
	2	16	mora diametri ☉	- - - -	31 38
		4	mora diam. ♀	- - - -	56
4	54	39	limb. occ. ☉ ad hor.		
4	55	55	centr. ♀ ad hor.		
	1	16	♀ à limb. bor. ☉	- - - -	5 5
5	19	36	limb. occ. ☉ ad hor.		
5	20	45	centr. ♀ ad hor.		
	1	9	♀ à limb. bor. ☉	- - - -	5 30
5	24	44	limb. occ. ☉ ad hor.		
5	25	52	centr. ♀ ad hor.		
	1	8	♀ à limb. bor. ☉	- - - -	5 35
5	53	30	limb. occ. ☉ ad hor.		
5	54	30	centr. ♀ ad hor.		
	1	0	♀ à limb. bor. ☉	- - - -	6 18
5	57	50	limb. occ. ☉ ad hor.		
5	58	49	centr. ♀ ad hor.		
		59	♀ à limb. bor. ☉	- - - -	6 36
6	2	56	limb. occ. ☉ ad hor.		
6	3	53	centr. ♀ ad hor.		
		57	♀ à limb. bor. ☉	- - - -	6 44
6	42	16	limb. occ. ☉ ad hor.		
6	43	3	centr. ♀ ad hor.		
	47		♀ à limb. bor. ☉	- - - -	7 25

Temp.

Temp. ver. mat.

h	'	"						
6	51	42½	limbus occ. ☉ ad horarium					
6	52	27	cent. ♀ ad hor.					
		44	♀ à limb. bor. ☉	-	-	-	-	7 28
7	0	2	limb. occ. ☉ ad hor.					
7	0	44	cent. ♀ ad hor.					
		42	♀ à limb. bor. ☉	-	-	-	-	7 18
7	4	7½	limb. occ. ☉ ad hor.					
7	4	48	cent. ♀ ad hor.					
		40½	♀ à limb. bor. ☉	-	-	-	-	7 24
7	7	13	limb. occ. ☉ ad hor.					
7	7	53	cent. ♀ ad hor.					
		40	♀ à limb. bor. ☉	-	-	-	-	7 25
7	15	53	limb. occ. ☉ ad hor.					
7*	18	31	cent. ♀ ad hor.					
		38	♀ à limb. bor. ☉	-	-	-	-	7 33
7	52	36	limb. occ. ☉ ad hor.					
7	53	4	cent. ♀ ad hor.					
		28	♀ à limb. bor. ☉	-	-	-	-	8 10
7	58	5½	limb. occ. ☉ ad hor.					
7	58	32	cent. ♀ ad hor.					
		26½	♀ à limb. bor. ☉	-	-	-	-	8 14
8	3	2	limb. occ. ☉ ad hor.					
8	3	28	cent. ♀ ad hor.					
		†25½	♀ à limb. bor. ☉	-	-	-	-	8 24

\* The same in both the manuscripts. But there must be an error either in this number, or that next above. S. HORSLEY.

† The manuscripts still agree. The error probably lies upon the number next but one preceding, viz. the time of the appulse of the ☉'s west. limb to the hor. wire; which may have been 8 3 2½. S. HORSLEY.

Temp. ver. mat.

h	'	"						
8	6	4 $\frac{1}{2}$	limbus occ. ☉ ad horarium					
8	6	29	cent. ♀ ad hor.					
		24 $\frac{1}{2}$	♀ à limb. bor. ☉	-	-	-	-	8 38
8	24	28 $\frac{1}{2}$	limb. occ. ☉ ad hor.					
8	24	48	cent. ♀ ad hor.					
		†29 $\frac{1}{2}$	♀ à limb. bor. ☉	-	-	-	-	8 50
8	26	2	limb. occ. ☉ ad hor.					
8	26	21	cent. ♀ ad hor.					
		19	♀ à limb. bor. ☉	-	-	-	-	8 58
9	6	50	Videtur ♀ prolongari, ac velut radios emittere offuscantes limbum facie oc- cidentalī Solis.					
9	7	32	Contactus interior circularis.					
9	22	8	limb. ort. ♀ ad horarium.					
9	24	19	limb. ort. ☉ ad hor.					
		2 11	♀ à limb. bor. ☉	-	-	-	-	9 54
9	26	32	Egref. tot. ♀ à ☉.					

Amice rogatus observationem hanc communem facio, quamvis non nimis confidam, ejus præfertim causâ, qui horologio aderat, et quem in notando tempore minus fidelem aliquando deprehendi. Eclipsin ☉ hâc ipsâ die spectandam nubes eripuerunt.

† The manuscripts agree : but the error is manifest. Read 29 $\frac{1}{2}$ . S. HORSLEY.

Eclipsis ☉, die 25 Maii, anni 1770. Pekini,  
in residentiâ Sancti Iosephi, tubo 8 pedum,  
observatâ.

Temp. ver.

h ' " ' " "

Diam.☉ capta plur.= $33\frac{5}{8}$  Rev.=31 35 44

7 31 7 Cœperat Eclipsis.

7 31 0 Init arbitratum.

Pars ☉ illuminata.

7	38	11	-	-	-	-	-	-	-	29	25	35
7	39	34	-	-	-	-	-	-	-	27	54	21
7	40	40	-	-	-	-	-	-	-	27	27	44
7	42	23	-	-	-	-	-	-	-	26	47	6
7	43	45	-	-	-	-	-	-	-	26	10	40
7	45	14	-	-	-	-	-	-	-	25	56	40
7	46	21	-	-	-	-	-	-	-	25	32	31
7	47	49	-	-	-	-	-	-	-	25	7	37
7	49	25	-	-	-	-	-	-	-	24	42	24
7	50	30	-	-	-	-	-	-	-	24	11	34
7	51	59	-	-	-	-	-	-	-	23	35	8
7	54	32	-	-	-	-	-	-	-	22	50	19
7	55	47	-	-	-	-	-	-	-	22	36	18
7	57	25	-	-	-	-	-	-	-	22	19	29
7	58	26	-	-	-	-	-	-	-	21	51	28
7	59	29	-	-	-	-	-	-	-	21	37	27
8	0	36	-	-	-	-	-	-	-	21	16	26
8	1	52	-	-	-	-	-	-	-	21	1	1
8	2	57	-	-	-	-	-	-	-	20	44	13
8	4	18	-	-	-	-	-	-	-	20	30	11
8	5	25	-	-	-	-	-	-	-	20	23	11
8	6	42	-	-	-	-	-	-	-	20	9	10

Temp.

# [ 38 ]

Temp. ver.			Pars ☉ illuminata.									
h	'	''								'	''	'''
8	7	49	-	-	-	-	-	-	-	19	42	33
8	9	35	-	-	-	-	-	-	-	19	32	45
8	10	49	-	-	-	-	-	-	-	19	1	56
8	13	1	-	-	-	-	-	-	-	18	58	44
8	13	56	-	-	-	-	-	-	-	18	54	56
8	15	30	-	-	-	-	-	-	-	18	39	31
8	16	55	-	-	-	-	-	-	-	18	32	30
8	18	20	-	-	-	-	-	-	-	18	31	6
8	20	30	-	-	-	-	-	-	-	18	29	42
8	21	33	-	-	-	-	-	-	-	18	24	6
8	23	2	-	-	-	-	-	-	-	18	28	18
8	25	30	-	-	-	-	-	-	-	18	38	6
8	27	12	-	-	-	-	-	-	-	18	40	55
8	28	30	-	-	-	-	-	-	-	18	47	55
8	35	34	-	-	-	-	-	-	-	19	21	33
8	37	58	-	-	-	-	-	-	-	19	36	57
8	39	24	-	-	-	-	-	-	-	19	41	9
8	41	16	-	-	-	-	-	-	-	19	48	9
8	44	14	-	-	-	-	-	-	-	19	55	10
8	46	47	-	-	-	-	-	-	-	21	2	25
8	48	2	-	-	-	-	-	-	-	21	22	2
8	49	16	-	-	-	-	-	-	-	21	31	51
8	50	26	-	-	-	-	-	-	-	21	48	40
8	52	37	-	-	-	-	-	-	-	22	2	40
8	56	42	-	-	-	-	-	-	-	23	51	57
8	58	19	-	-	-	-	-	-	-	24	42	24
9	0	17	-	-	-	-	-	-	-	25	7	37
9	1	41	-	-	-	-	-	-	-	25	17	26
9	2	58	-	-	-	-	-	-	-	25	24	27
9	5	52	-	-	-	-	-	-	-	26	44	18

Temp.

# [ 39 ]

Temp. ver.			Pars ☉ illuminata.												
h	'	"											h	'	"
9	7	42	-	-	-	-	-	-	-	-	-	-	27	29	8
9	9	27	-	-	-	-	-	-	-	-	-	-	27	55	45
9	10	49	-	-	-	-	-	-	-	-	-	-	28	13	59
9	12	6	-	-	-	-	-	-	-	-	-	-	28	33	36
9	13	44	-	-	-	-	-	-	-	-	-	-	29	7	13
9	14	52	-	-	-	-	-	-	-	-	-	-	29	17	2
9	17	34	-	-	-	-	-	-	-	-	-	-	30	48	6
9	19	52	Finis Eclipseos.												

Eclipsis ☉, die 23 Octob. anni 1771. Pekini,  
in residentiâ S. Josephi, per me ægrotum ob-  
servata.

h ' "

11 22 6 Init. Eclipseos.

13 37 13 Finis.

Maximam Eclipsefin non notavi.

24 à 6 testus, die 5 Julii 1770. Pekini, in residentiâ  
Sancti Josephi, tubo 8 pedum, observatus.

**Ingressum non observavi, tarde accedens ad obser-  
vandum.**

Temp. ver.

## h / //

1 1F

[illegible]

\* The manuscripts agree. It is uncertain, whether the error be upon the number next preceding, or the next but one.  
S. HORSLEY.

Temp.

Temp. ver.													
h	'	"											
8	59	3	u										
9	1	15	T										
	2	12	-	-	-	-	-	-	-	-	-	25	22
9	12	24	u										
9	14	40	T										
	2	16	-	-	-	-	-	-	-	-	-	25	37
9	19	11	u										
9	21	46	T										
	2	36	-	-	-	-	-	-	-	-	-	2	54 <sup>8</sup>
9	28	29	u										
9	31	22	T										
	2	53	-	-	-	-	-	-	-	-	-	26	13
9	34	19	u										
9	37	20	T										
	3	1	-	-	-	-	-	-	-	-	-	26	22
9	14	56	u										
9	45	9	T										
	3	13	-	-	-	-	-	-	-	-	-	26	29
9	52	49	u										
9	56	*7	T										
	3	28	-	-	-	-	-	-	-	-	-	26	39
10	5	6	u										
10	8	53	T										
	3	47	-	-	-	-	-	-	-	-	-	26	43
10	14	37	u										
10	18	37	T										
	4	0	-	-	-	-	-	-	-	-	-	26	44

\* It is so in both the manuscripts, but if the numbers next above and next below be right, this ought to be 17. S. HORSLEY.

Adde sequentes observationes eodem tubo per me  
factas.

In residentiâ Sancti Josephi.

* Spic. Virg. a c tecta, d. 25°. Jan. 1772.	
Ingr. 5 <sup>h</sup> 27' 41'' t. v. * a limb. bor. c	29 2
Egr. 6 34 07 * a limb. bor. c	19 30
Capta c diameter.	32 29

In residentiâ Sancti Josephi.

* Scorp. a c tecta, d. 29°. Jan. 1772.	
Ingr. 4 <sup>h</sup> 16' 35'' t. v. * a limb. aust. c	13 0
Egr. 5 33 31 * a limb. aust. c	20 9
Capta c diameter.	31 53

- - In collegio Pekin.

† in parallelo ☉ d. 5°. Jan. 1772.	
diam. ☉ - - - - -	
6 <sup>h</sup> 35' 47'' limb. ort. ☉ ad hor.	31 44
☉ 55 05 † ad hor. a parallel. limb. bor.	22 11
3 16 13 diff. asc.	diff. decl. 9 33

Eclipsis

Eclipsis Lunæ totalis, anno 1761, Novembris 12°,  
vespere observata, Pekini Sinarum.

In Observatorio domestico Collegii Soc. Jesu.

	P. Florian Bahr.	P. Ignatius Francisco.	P. Josephina Bernardo
	Tubo 5 pedum	Tubo 7 pedum.	Tubo 8 pedum.
	h / "	h / "	h / "
Initium Eclipses	5 29 12	5 28 4	5 29 3
Immers. tot. Lunæ	6 28 59	6 24 33	6 27 18
Init. emerf. Lunæ	8 2 37	8 7 2	8 4 23
Finis eclipses	9 4 32	9 4 42	9 3 52
Medium. ex init. } et fine - - }	7 16 52	7 16 23	7 16 27
Med. ex immer. } et emerf. - }	7 15 48	7 15 47	7 15 50
Et horum med.	7 16 20	7 16 5	7 16 8
Ex his confit med. eclipses		7 16 11	

Et observata sunt hæc ad pendulum, quod quotidie  
ad solem et stellas exigitur, telescopia meridiano,  
quod, vocant "l'instrument des passages."

In Observatorio Regio, tubo 8 pedum cum duobus objectivis et reticulo.

	h	'	"		h	'	"
Initium eclipsæ	5	27	30	Initium Emerf.	8	5	30
Digit. umbræ I.		32	30	Digit. lucis I.		11	0
II.		37	0	II.		16	0
III.		42	0	III.		21	30
IV.		47	0	IV.		26	30
V.		52	0	V.		31	0
VI.		57	0	VI.		35	30
VII. 6		2	0	VII.		41	0
VIII.		7	0	VIII.		46	0
IX.		11	0	IX.		50	30
X.		16	0	X.		55	0
XI.		22	0	XI.	9	0	0
Immerf. Lunæ tot.	27	0	0	Finis eclips.		5	0

Ex his conficitur medium eclips. 7 16 20

Atqui constat observatorium regium orientalius esse collegio 14'' pend.

Observata sunt hæc ad horologium manuale bonæ notæ, quod ante cum eodem pendulo compositum, et post cum illo collatum sibi probe constitit, uti alias solet.

Tempora

Tempora sunt vera omnia. Numeri ab observatione intacti. Cœlum toto tempore serenum fuit, et quietum a vento; umbra tamen terræ admodum non terminata, præsertim initio: Luna in umbra semper clarè visa tota, margine bene terminato; quin tamen maculæ distinguerentur. Color Lunæ instar ferri candentis; post immersionem obscurior, et ante emersionem obscurior, quâ axem umbræ, in medio umbræ obscurior, quâ centrum terræ spectabat. Paullo ante initium emersionis visa stellula sic satis lucida, verticaliter Lunæ imminens, nempe in tubo situ inverso, distans a limbo Lunæ quasi  $\frac{2}{3}$  diametri; et spes erat videndi hujus occultationem, antequam eclipsis finiret: sed vix digitus unus Lunæ emerfit, cum lumine Lunæ extincta videri desit. Porro,

		h	'	'	
Medium Eclip-	{ D. Hallerii	7	20	56	} Ad merid. Collegii hujus.
seos dabant	{ D. Cassini	7	23	20	
tab.	{ P. Gramatis	7	22	26	
Institit. Astron. D. Monnier		7	15	39	
Ephemerides Parisienses, nescio ex quibus tabulis		7	33	33	

Folium, in quo præsens observatio erat notata, perditum fuerat, et, die 19 Octobris anni 1772, casu inventum; adeoque hæc observatio eclipsæ Lunæ nunquam in Europam fuit missa.